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N°. X.

Experiments on Evaporation, by C. WISTAR, M. D.

Read Feb. 5, 1796. **I**N an Essay published in the last Volume of the Transactions of the Society, I described a species of evaporation which was excited by suspending ice, at the melting point, in air reduced to the temperature of 0 of Fahrenheit's scale; and considered it as the effect of a general law of nature, in consequence of which an inelastic vapour, (which commonly is visible,) arises from water, and from wet substances, whenever they are warmer than the atmosphere which surrounds them.

From facts stated in the same paper it was inferred, that this inelastic vapour does not depend upon any positive quantity or degree of sensible heat in the evaporating body, but upon a relative degree, exceeding that of the atmosphere to which it is exposed; and that it is produced by the passage of heat from the moist body into the contiguous air.—If this theory be true, it follows that a slow distillation may be performed, with the common apparatus, by applying cold to the receiver or refrigeratory, without increasing the heat of the retort or substance to be distilled, as there will be a continual passage of heat from the body to be evaporated or distilled, into the air of the receiver.

Although, for the reasons there given, I had no doubt of the truth of the doctrine advanced in my former paper, I was desirous of submitting it to the test of this experiment, because it has been suggested that the vapour which appeared to arise from ice, might have arisen from the mixture of different portions of air of different temperatures;

peratures; whereas by distilling or evaporating in a luted retort and receiver, there can be no mixture of warm and cold air; and by using a substance which is not contained in the atmosphere, we shall avoid all suspicion that the vapour which arises from it, may have originated from the air in the vessels.

With these views I poured an ounce and half of vitriolic æther into a retort and luted it to a receiver with a long neck, which was placed in a mixture of salt and snow, while the retort was surrounded by air of the temperature of 50° of Fahrenheit. The frigorific mixture, from the impurity of the salt, was seldom below 10° , so that the difference, between the æther in the retort and the air in the receiver, did not exceed 40° .

When the apparatus had been thirty hours in this situation the frigorific mixture was removed, and one third of the æther was found distilled into the receiver.

I believe no cause can be assigned for this distillation but the passage of heat through the æther into the cold air of the receiver; and to be certain that the application of cold to the receiver *really produced it*, I prepared a similar distilling apparatus, in the same manner precisely, and placed the retort in contact with that of the other apparatus, while the receiver, instead of being chilled by the cold mixture, stood in air of the same temperature with the retorts, viz. 50° ; but no distillation took place during thirty hours.

To vary the experiment, I placed some camphor in another apparatus prepared as above, and fixed the receiver in the frigorific mixture, while the retort stood in air of the temperature of 50° , at the expiration of thirty hours some of the camphor was found sublimed, and the sublimate had those arborescent appearances which usually attend it when produced by heat.